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CAPITAL INVESTMENT AND ITS EFFECT ON AGRICULTURAL PRODUCTION AND DEMAND FOR AGRICULTURAL PRODUCTS 1/

Egbert deVries

and

Oscar Zaglits

Summary

Capital investment in agriculture is necessary to increase labor productivity and allow a decreasing percentage of population to feed the world. In an early stage of development, progress in agriculture is achieved mainly by investment of rural labor, both on the farm and through massive community projects. The latter aim mainly at permanent land improvements so as to make possible closer settlement and thus to allow an increased population to live on the land. As development progresses, credit (first by middlemen, later by cooperatives, rural banks, and special agricultural credit agencies) becomes increasingly necessary to support investments on the farm.

In a dynamic economy, distinction can be made between:

1. Investment on the farm (for permanent land improvement, tree crops, livestock, farm buildings, machinery, fertilizers, etc.):

2. Investment in specific services to agricultural production and marketing (water control works, storage, processing, marketing):

3. Investment (public as well as private) in services shared by farmers and non-farmers (transportation, communication, electrification, education, health services):

4. Investment in urban development and industrialization in general.

I. Scope of the Problem

In discussing the topic assigned to this part of the Conference, we must recognize that investment in other sectors of the economy is just as necessary for the improvement of the living conditions of the farm population as is direct investment in agriculture.

Even in an early stage of the development, peasants sell a part of what they produce to non-farmers or make certain payments or tithes in kind. No major

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1/ This paper was prepared for the International Population Conference, which met in Rome on August 30, 1954. Egbert deVries is Chief of the Agricultural Division of the International Bank for Reconstruction and Development. Oscar Zaglits is Chief of the Monetary and Policy Research Branch Foreign Agricultural Service

improvement is possible in agriculture and in rural living without a progressive shift from a predominantly subsistence agriculture to production for the market. Markets, in turn, depend on urbanization, industrialization, and the development of transportation, communications, and trade on an international as well as national scale--all of which hinges, of course, on capital investment. In other words, agriculture can never become developed merely for agriculture's sake, but only if, through industrial development, urban populations expand in the same country or in other parts of the world and if, as a result, the demand for food and other agricultural products increases.

For the farmer, it is important that this development provides, also, outlets for the rural surplus population. As market demand for farm products rises, farmers find it profitable to change their production methods and to increase their labor efficiency so as to be able to produce more.

This structural change in food production and supply may be illustrated by an example for a self-contained society in which a progressively larger part of the population becomes employed in non-agricultural pursuits, and in which increases in income levels and food consumption accompany this change.

Percentage of active population in agriculture	Food intake by farming population	Food available for other groups	Quantity of food one farmer(family)produces in percentage of own needs
70	56.5	43.5	177
60	49	51	204
50	42.5	57.5	235
40	35	65	286
30	28	72	357
20	19	81	527
15	15	85	667

The third column in this table indicates the amount of agricultural products to be marketed (excluding sales of food between farmers). It stands at the same time---in broad terms--for the proportion of farm income available for purchases of industrial goods, services, taxes, and savings.

Historic and geographic comparisons of agriculture show that there is a great difference between the character of agricultural investment in the early and in the more mature stages of industrial development.

In the early stages, progress in agricultural production is achieved mainly by the direct investment of rural labor (i.e., the use of surplus labor of the farm family in improvement work). This is possible because of the seasonal character of labor in agriculture.

Research in Indonesia with regard to labor needed to maintain draught cattle and the labor it performs for cultivation of the soil, etc., has shown that the animal is essentially an accumulator of human labor. Over a year, the human labor invested in caring for the animal is about equal to the animal's power contribution.

However, this human labor is spread over the year, whereas the draught animal's contribution is made at a crucial time of the season and then in a more concentrated form. With agricultural development, draught animals are being used more days of the year and, thus, are making a net contribution in power value over and above the labor invested.

Even in an early stage of agricultural development, there is a difference between continuous or scattered efforts of individual farmers that yield immediate or temporary results, and lasting improvements of the land by collective efforts that yield increased production over a long period. Early examples of the latter kind are the permanent water-control systems achieved by the old empires of Mesopotamia, Egypt, China and Peru.

With the development of better techniques, the divergence between both types of investment widens. Permanent improvements, in general a duty of the community, retain that feature to a large extent. However, with the support of industry and industrial techniques and the capital generated in a diversified economy, much more can be done than by merely organizing a massive peasantry as in Old China or Old Egypt.

II. Principal Categories and Types of Investment

In a dynamic economy we can, from an agricultural viewpoint, roughly distinguish between three types of investment:

1. Investment on the farm itself;
2. Investment in services to farmers; and
3. Investment in urban development and industrialization in general.

1. Investment on farms

In the earlier stages of economic development, capital investment on farms is, in general, ancillary to labor for permanent improvement. To a considerable extent this continues to be the case, even at more advanced stages of development. For example, farm houses are, in many countries, still built with farm labor, using local materials (timber, stone) and an occasional purchase from the city.

Capital investment on the farm in the modern sense and the specialization in production that it has made possible are rather late phenomena in the history of agriculture. In fact, these phenomena are younger than the industrial revolution; they are tied to scientific research and demonstrations. And they have developed only where economic conditions, as in particular industrialization at home or abroad, have created large markets where the increased production can be sold.

In some countries of Western Europe, the combination of scientific, technical, and economic forces, which alone can bring about modern development in agriculture, has been almost ideal. Since the second half of the eighteenth century, progress has been made in the application of science in agriculture and farm management

while simultaneously industrialization, urbanization, mechanized transportation, and a general improvement in the level of education have developed.

In other parts of the world, this combination of forces has made its impact later or less completely; has been less well synchronized; or has been only spotty. Countries, or parts of a country, have not kept pace because of geographic isolation, difficult topography, or other factors. Large regions have lagged behind because of unfortunate social conditions, such as antiquated land-tenure systems. It may be noted that, where this was at all feasible, farmers have generally responded to such conditions by mass emigration, once modern means of transportation made this possible.

In less developed societies, farm credit has, in general, been limited to tiding farmers over seasonal lows of income and to assisting them in crop failures, buying of farms, paying out of co-heirs, or paying of expenses for social occasions, such as weddings and funerals.

The need for seasonal credits designed to level off high and low periods of income and for investment credit increase with the development of farm production for the market. At the same time, the ability of farmers to service credits increases.

For many centuries, landlords, middlemen, and local moneylenders were the main sources of credit to the cultivator of the land. Their terms usually were harsh, often usurious. Modern times have brought the development of better farm credit. In some highly developed countries, commercial banks have become important sources of farm credit. Agricultural credit cooperatives have been organized and have grown in importance in many countries, less developed ones as well as more developed ones. Mortgage banks and, more recently, special agricultural credit institutions have also been set up in many countries. Some of them have been designed specifically for the purpose of financing medium-term development loans. These loans may run from 3 years for buying farm machinery to 20 years for land settlement. The over-all magnitude of this new type of credit is unknown; most banks, however, carry it as a separate category in their books. Where private capital is not very well organized to make these credits available and farm cooperatives don't have enough funds, governments have become a supplementary source of credit for comprehensive development programs.

Development of agriculture for the market, especially when credit is utilized in such development, is not without risk. To the natural hazards there are added the hazards of changes in demand and of the development of competing production in other areas. The latter hazard becomes great if demand is relatively inelastic. Inadequate knowledge of markets and marketing changes also increases farmers' risks. On the other hand, the high percentage of fixed costs in agriculture limit the ability of farmers to take risks.

A sount proportion between the farmer's own assets and his indebtedness, low interest rates, adequate repayment terms, and adjustment of such terms in periods of crop failure or low market prices are needed to reduce the risks of agricultural credits. For such reasons, cooperative and governmentally sponsored credit agencies are best suited, in underdeveloped countries, as sources of credit for small and medium-size farms.

2. Investments in services to farmers

Off-farm investments, designed to service farmers, have been known since the early times of human civilization, but their importance has greatly increased due to the development of modern techniques of water control, storage, processing, and marketing. With this development, a tremendous need has arisen for capital investment in services for agriculture. The scope and possibilities of water-control works, such as flood control, irrigation, and drainage, and, thus, the need for investment capital for such projects, increased greatly when we learned to make and use reinforced concrete, excavators, and bulldozers. As a result, vast areas of tropical plains became suitable for food production, and in many other parts of the world agricultural production could be intensified.

In the multipurpose river-basin projects, the provision of water for irrigation, the protection of densely populated areas from floods, and power developments adding industrial activity to agriculture, are combined to provide for economic advancement in an integrated fashion. The United States, France, India, Australia, and many other countries offer great scope for these river-basin developments.

In the construction of storage facilities, modern techniques have brought tremendous improvements over primitive storage methods that date back to Old Egypt. Staple food, such as grain, can now be protected much better against insects and rodents. Refrigeration allows us to keep perishables fresh for long times and to ship them over vast distances. Grass and legumes can be stored fresh in modern silos, thus preserving valuable nutrients for livestock feeding. Modern processing is also essentially an improvement of long-known techniques. Both modern storage and modern processing are performed largely off the farm.

Marketing has long remained relatively primitive, but in our time effective marketing has become a necessary corollary of specialization in farm production. It employs standardization, improved packing methods, demand outlook research, promotional activities, and many other techniques.

Where modern marketing is developed, the peasant's dependence on the landlord or the local merchant for the sale of his produce and for the advance of money needed in production and living comes to an end. Farmers are being linked to distant consumers by a network of experienced traders, warehousemen, and processors, operating under competitive conditions; by marketing, processing and purchasing cooperatives, and sometimes also by public marketing facilities.

As the importance of local markets is being reduced, a dependence develops on national and world markets, which has far-reaching consequences. It adds market risks to the vagaries of nature. It intensifies the adverse effects of local crop failures, as these no longer influence the market price. But it also enables farmers to sell local bumper crops with less effect on prices. Thus, while offering opportunities for higher income and better living, improved marketing and subsequent changes in production patterns may also have a destabilizing effect on farmers' income.

Transportation and communications are services needed by agriculture as well as by the other sectors of the economy. Even in ancient times, these services were required, and, in primitive forms, were provided. Today many thousands of farmers in economically less developed countries make their living by means of producing special crops for distant markets, such as rubber, coffee, tea, cocoa, jute, or spices. In fact, the economy of some countries or areas depends on export crops.

The more farmers shift to producing for the market, the more they specialize, and the more distant their markets become, the more does agricultural development become dependent on means of transportation and communication.

In general, the initiative to facilitate transportation has come from the consumers. Shipping is private business, though often government-sponsored or subsidized. Railways are, in many countries, in public hands and in most of the others controlled by the government. Highways have always been a public undertaking. Whether through private or through public channels, these capital investments from non-agricultural sources foster agricultural production.

If farm products are to be marketed effectively, the national railway and highway systems need to be supplemented by secondary or feeder roads, which often can be built with farm labor. Only reliable all-weather feeder roads allow perishable products to reach distant consumers. Feeder roads often alter the pattern of production completely. For example, they may mean a change from wool to meat, from cheese to fluid milk, from coffee and cotton to food crops, from grains to root crops, and from general types of farming to truck cropping or poultry farming. This shows that investments in better transportation not only lead to cheaper and increased food production, but also to a closer adjustment of production to favorable natural conditions.

Power is another service that is important to agriculture as well as to industry. Animals and human labor are sources of power on the farm itself. They are still the most important sources of power for agriculture in the densely populated, less developed countries. But as agriculture is being modernized they are supplemented and to a large part replaced by off-farm sources of power, such as electricity and oil.

While thus reducing the need for capital investment in draft animals, modernization of agriculture increases the need for equipment, fertilizers, pesticides, etc., which are produced off the farm. All this links the farmers closer and closer to the other sectors of the economy and increases their interdependence.

Last but not least, farmers must, of course, be assured of their share in modern education and in modern health and sanitation facilities, which also require large capital investments.

3. Investment in urban development and industrialization

In addition to investment on the farm and investments providing services to farmers, investment in the urban sector of the economy and in general industrial development is of great importance to agriculture. It is needed to develop the consumer

purchasing power upon which the farmer depends once he produces for the market; and it is needed to provide farmers with consumer goods, and to facilitate the production of the goods and services required for modern farming and agricultural marketing. Moreover, the funds spent in industrial or general economic development, especially their local-currency part, increases the demand for farm products.

Thus only over-all and balanced development of agriculture and industry, nationally and internationally, can bring progress and better living to the rural as well as the urban population of the earth.

III. Impact on Population Problems

In the context of the World Population Conference, it may be noted that only certain types of capital investment tend to be followed by higher population densities per hectare of cultivatable land.

As a general rule the most important examples are irrigation works leading to higher and more stable yields or to double-cropping, investments providing for permanent land use in the place of shifting or rotating cultivation, and investments in the transformation from grassland into cropland or the drainage of peatland

Improved transportation and better marketing possibilities, even when they lead toward more specialized and higher production, tend to raise income levels. In general, they have not much effect on the intensity of agricultural production or the density of rural settlement. The only exceptions to speak of are very intensive truck, vegetable, dairy, and poultry farming where a very high labor input per hectare receives adequate reward.

Capital investment on the farm for the purpose of increasing production tends to be followed by an outflow of labor from the rural area. Labor-saving devices in agriculture, of course, do not tend to enable more people to live on the land. If adequate markets are secured, they do lead, however, to rapidly increasing incomes per head, even in the face of the servicing of heavy capital investments. Areas where population already was dense before farm investments for improved techniques were introduced (such as Egypt, many parts of Southeast Asia, and Japan) are in a particular squeeze. Increased production on existing land, and especially increased income per farmer, is highly correlated to labor-saving methods (mechanization). But the country cannot absorb surplus population from the land unless its industries can grow rapidly enough to provide enough jobs. The latter is at present much more difficult than it was in the France of Colbert, because industry itself must mechanize in order to be competitive.

For this reason, a balanced growth of the economy requires that agricultural investment be geared to the scope of the development of marketing opportunities for farm products and that the major portion of investment flows to industry and the development of general facilities for both agriculture and industry such as transportation, communication, and power.

Since the demand for food increases less with rising income than the demand for other goods and for services, balanced growth of an under-developed economy will,

in general, be secured only if a large portion of the available capital (public and private) is employed outside of agriculture. As a rule of thumb, the rate of increase of production in the non-agricultural sectors should be twice that in the agricultural sector, If the latter creates about half of national income (the average for the so-called underdeveloped areas of the world) about one-third of the total capital investment should therefore be directed to this sector.

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